

Amendments to the Claims:

This Listing of Claims will replace all prior versions and listings of claims in the application:

Claims 1-65. (Canceled)

66. (New) A wafer processing tool for processing a sequence of wafers and including an integrated wafer inspection station, the wafer processing tool comprising:

a plurality of wafer processing slots, each wafer processing slot shaped to contain any of a plurality of wafer processing stations each of which processes wafers in accordance with a set of wafer processing parameters specific to that wafer processing station;

at least one wafer handler operable to transport wafers between any of the plurality of wafer processing slots;

a wafer inspection station dimensioned to be contained within one of the plurality of wafer processing slots to receive a wafer from the wafer handler, the wafer inspection station including an optical measurement system forming a scatterometry instrument that is moveable to specified locations over a wafer in the wafer inspection station in order to direct a light beam as a spot onto patterned features of the wafer and obtain characteristic optical signatures for the illuminated patterned features; and

a data processor operable to receive and analyze the characteristic optical signatures in order to analyze the wafer after processing in any of the plurality of wafer processing stations, the data processor being further operable to alter the wafer processing parameters of at least one of the wafer processing stations to be used for processing subsequent wafers in the sequence of wafers based upon the characteristic optical signatures.

67. (New) A tool as in claim 66, and wherein:

the data processor is operable to use a scattering model for possible periodic structures on the wafer to obtain a measure of the patterned features on the wafer so that a process carried out by any of the wafer processing stations can be analyzed.

68. (New) A tool as in claim 66, and wherein:

the optical signatures include independent optical parameters selected from the group consisting of wavelength, incidence angle, and altitude and azimuthal collection angles.

69. (New) A tool as in claim 66, and wherein:

the optical measurement system includes an objective lens imaging light from the spot on the wafer, the optical measurement system forming a low numerical aperture (NA) system with an $NA < 0.4$ for optimum scatterometry.

70. (New) A tool as in claim 66, and wherein:

the wafer inspection station includes an x-y stage driving the optical measurement system and a wafer support holding the wafer stationary within the wafer inspection station.

71. (New) A wafer inspection station for integration within a wafer processing tool operable to process a sequence of wafers in accordance with a set of processing parameters that is specific to each of a plurality of wafer processing stations included in the wafer processing tool, the wafer inspection station dimensioned to be contained within any of a plurality of processing slots in the wafer processing tool and operable to receive a wafer from a wafer handler for transporting wafers between any of the plurality of processing slots, the wafer inspection station comprising:

an optical measurement system forming a scatterometry instrument that is moveable to specified locations over a wafer in the wafer inspection station in order to direct a light beam as a spot onto patterned features of the wafer and obtain characteristic optical signatures for the illuminated patterned features; and

a data processor operable to receive and analyze the characteristic optical signatures in order to analyze the wafer after processing in a wafer processing station in any of the plurality of wafer processing slots, the data processor being further operable to alter the set of process parameters of at least one wafer processing station to be used in

processing subsequent wafers in the sequence of wafers based upon the characteristic optical signatures.

72. (New) A wafer inspection station as in claim 71, and wherein:

the data processor is operable to use a scattering model for possible periodic structures on the wafer to obtain a measure of the patterned features on the wafer so that a process carried out by a wafer processing station can be analyzed.

73. (New) A wafer inspection station as in claim 71, and wherein:

the optical signatures include independent optical parameters selected from the group consisting of wavelength, incidence angle, and altitude and azimuthal collection angles.

74. (New) A wafer inspection station as in claim 71, and wherein:

the optical measurement system includes an objective lens imaging light from the spot on the wafer, the optical measurement system forming a low numerical aperture (NA) system with an $NA < 0.4$ for optimum scatterometry.

75. (New) A wafer inspection station as in claim 71, and further comprising:

an x-y stage operable to drive the optical measurement system; and

a wafer support operable to hold the wafer stationary within the wafer inspection station.

76. (New) A method of inspecting a wafer within a wafer processing tool for processing a sequence of wafers and that includes a plurality of wafer processing stations in a plurality of wafer processing slots, each wafer processing station operable to process a wafer in accordance with a set of wafer processing parameters that is specific to that wafer processing station, the method comprising:

transferring a wafer from any of the wafer processing stations to a wafer inspection station, dimensioned to be contained within a wafer processing slot, using a wafer handler operable to transfer wafers between any of the plurality of processing slots;

positioning a measurement spot of an optical head of a measurement instrument within the wafer inspection station over at least one location on the wafer and measuring an optical characteristic of the wafer at each location using a scatterometry instrument;

analyzing the optical characteristic to obtain a measure of the surface of the wafer; and

altering the set of process parameters of at least one processing station to be used for processing subsequent wafers in the sequence of wafers.

77. (New) A method as in claim 76, and wherein the analyzing step comprises analyzing the optical characteristic using a scattering model for possible periodic structures on the wafer to obtain a measure of the patterned features on the wafer so that a process carried out by any of the wafer processing stations can be analyzed.